Laser Protection Technology: The Current Situation

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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The 2009 Military Combat Eye Protection User Survey - June 2009

Source: United States Army Center for Health Promotion and Preventive Medicine
In support of: Tri-Service Vision Conservation and Readiness Program

Question: Have you had problems with the following?

	2009	2008
Vision with MCEP	11%	13%
I have had no problems with my MCEP	13%	21%
Vision with Inserts	19%	9%
Ordering/Receiving Inserts	19%	
Obtaining MCEP	26%	
Fit/Comfort of MCEP	33%	32%
Switching from tinted to clear shields (or clear to tinted)	40%	24%
Fogging of MCEP	52%	58%
Scratching of MCEP	64%	59%

- A total of 12 Soldiers:
  - Nine from 172nd Infantry Brigade
  - Three from 11th Armored Cavalry Regiment

- Questions:
  - Do you believe shining hand-held lasers into someone's eyes can cause permanent eye damage?
    - All responded by saying, "Yes."
  - Do you want laser eye protection incorporated into your protective eyewear?
    - All responded by saying, "No."
    - Concerned that eye protection has permanent tint.

Soldier Vision Protection: The Current Situation

Soldier Vision Protection Elements: Ballistic, Sunglasses, Laser Protection

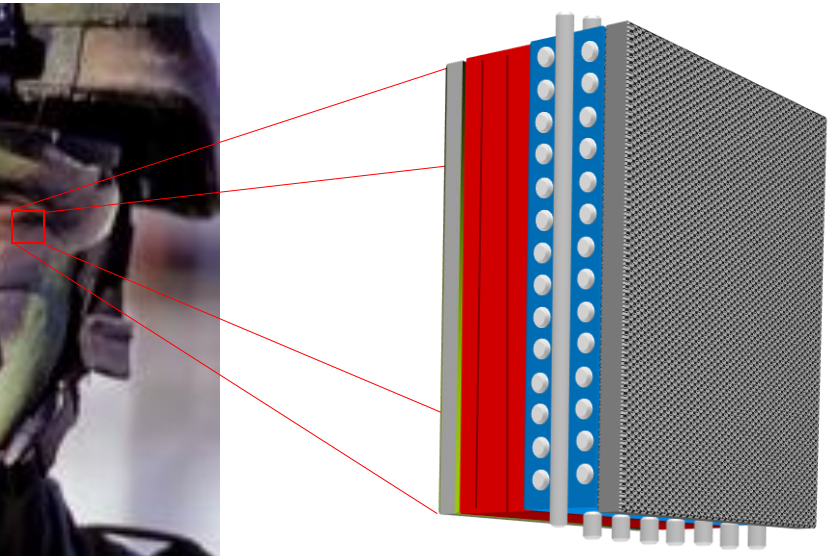
- Ballistic: Better transparent armor currently transitioning with more improvements underway
- Sunglasses: Variable transmission desired with manual and automatic control
- Laser Protection: Threat predicted for years, now it is here, though not as expected
  - Threat/hazard is primarily hand-held, cw lasers purchased by Soldiers and their families
  - Problem is mostly at night
  - Current, passive, fixed-line dyes and dielectrics darken the lens
  - Proposed frequency-agile, passive, nonlinear dyes darken the lens
  - Soldiers are not concerned enough about lasers to wear a dark lens at night
  - Dark lenses cannot function as variable transmission lenses
  - Single lens system is desired

- Laser eye protection technology must be high transmission

- An active lens format may be required in order to incorporate frequency agile laser protection against a broad range of threats/hazards into a variable transmission format

- New technology should:
  - Be useful for cw, laser dazzle, flash, glare, pulsed lasers
  - Allow for single lens system
  - Be a non focal plane format to allow for evolutionary approach to incorporation of new technology – new technologies combined with old technologies, such as dyes and dielectrics
  - Enables vision enhancement as well as vision protection
  - Allows us to redefine and expand the possibilities for a Soldier Vision System

Laser Protection Requirements



Requirements:

- Frequency agile laser protection
- Single system to protect against both pulsed and cw laser threat throughout visible spectrum
- Non focal plane
- Low/no power requirement
- Must interface with weapons systems
- Low bulk/weight
- Must maintain peripheral awareness, color differentiation and visual acuity

The requirement for high transmission is a major technology driver

- Must be appropriate for use at night
- Must be considered part of a single multi-functional lens system

Integration is the Key!

For Next Generation Soldier Vision Protection Eyewear

Wanted: New vision protection and enhancement technology in a high-transmission single lens format that also provides ballistic protection, fast variable transmission, abrasion resistance and anti-fogging

Variable Transmission Lens
- •High light-dark contrast ratio (85%-15%)
- •Fast light-dark transition time (<1s)

High Optical quality
- •Color neutrality
- •ANSI Z87.1 compliance
- •Minimal optical distortion
- •UV protection
- •Haze < 3%
- •Maintain peripheral vision

Frequency-Agile Laser Protection
- •Can be combination fixed-line/tunable
- •Laser eye protection required against
  - Laser Dazzle
  - Continuous wave lasers
  - Pulsed Laser

Ballistic Platform Integration

Environmental Hardening

Anti-fog